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OBSERVATIONS OF HEARING FLUCTUATIONS
IN CLEFT PALATE CHILDREN

BY

VIRGINIA LYNN DEMAIN
B.A., Florida Technological University, 1973

THESIS

Submitted in partial fulfillment of the requirements
for the degree of Master of Arts
in the Graduate Studies Program of
Florida Technological University

Orlando, Florida
1975

To my dearest friend Leon
whose faith changed my life
this thesis is affectionately
dedicated

ACKNOWLEDGMENT

I would like to express my sincere appreciation to all those individuals without whose help this study would not have been accomplished. To my committee chairman, Dr. Thomas A. Mullin, whose assistance and guidance was invaluable, my sincere appreciation. My gratitude also goes to Elizabeth Lewis, Sylvia Ayres, Judy Monaco, and Becky Herrero who generously gave of their valuable time to assist with the children involved. Finally, my appreciation goes to Laura who has always been a source of confidence and strength.

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Introduction and Rationale

Research has demonstrated that the incidence of hearing loss is significantly higher among those with cleft palate than it is for those without cleft palate (Gaines, 1940; Means and Irwin, 1954; Holmes and Reed, 1955; Miller, 1956). According to Gaines (1940), a survey of the literature over a ten year period prior to 1940 revealed no scientific investigation concerning loss of hearing in cleft palate patients. Harrison and Philips (1971) showed that 71 per cent of cleft palate children have hearing loss during any one month.

Cleft Palate

About the eighth week of gestation two shelves (palatine process) emerge from the innerside of the maxillary process and eventually form the main body of the palate (Berry and Eisenson, 1956). The final stage of development starts about the ninth week. After the tongue drops, a triangular wedge in the primitive palate (premaxilla) receives membranous ossification and joins with the maxillary processes in a backward growth (Bzoch, 1971). By the tenth week of gestation the union of the hard and soft palate should be complete (Zemlin, 1971).

Although classifications differ, there are four major types of clefts: clefts of the soft palate, clefts of the soft and hard palate, clefts of the soft and hard palate on one side of the premaxilla, and

clefts of the soft and hard palate on both sides of the premaxilla (Van Riper, 1972). These classifications of clefts are illustrated in Figure I. Palatal clefts stem from embryological failure, or more rarely, from accidents (Bzoch, 1971).

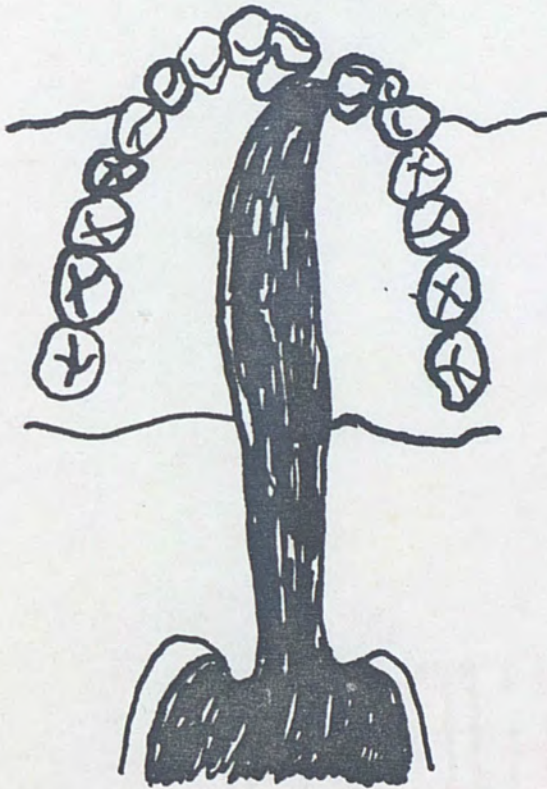
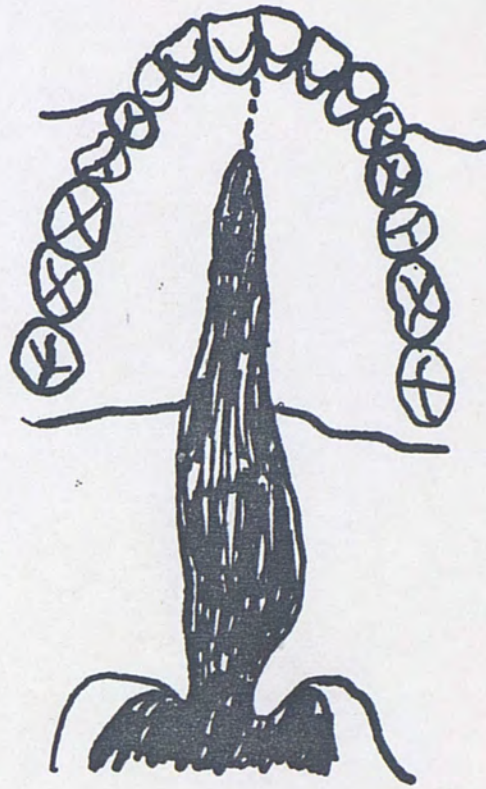
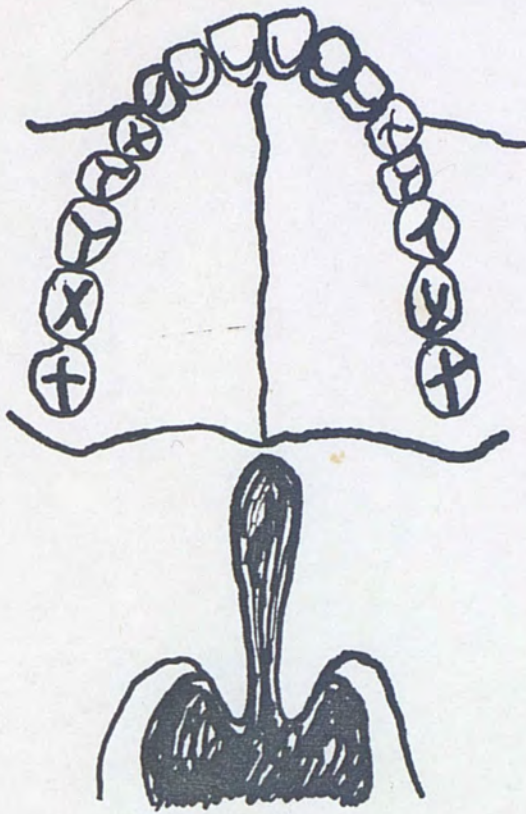
Van Riper (1972) states that when the cleft is in the prepalate or in both prepalate and palate, the cause may be hereditary. When the palate alone is cleft, other causal factors such as malnutrition, drug reactions, fetal anoxia (lack of oxygen in the blood, usually due to incompatible blood groupings), and mechanical injuries may be suspected. The inability of the structures to unite has also been explained in terms of the failure of the tongue to descend from the nasal cavity in which it resides before the embryonic palatal shelves begin their growth toward the midline (Sataloff, 1956; Masters, 1960).

Hearing Loss

Hearing loss is defined as a malfunction of the auditory mechanism causing a loss of sensitivity of hearing (Davis and Silverman, 1970). In a medicolegal context hearing loss or hearing impairment implies a severity sufficient to affect personal efficiency in the activities of daily living, specifically in regard to communication (Zemlin, 1968).

There are three basic types of hearing losses: (1) conductive, (2) sensorineural, and (3) mixed (Berry and Eisenson, 1956; Davis and Silverman, 1970; Rose, 1971; Van Riper, 1972).

A conductive loss is a hearing impairment due to interference with the acoustic transmission of sound to the sense organ, usually in the outer or middle ear (Rose, 1956). In conductive hearing losses the hearing threshold levels (the lowest level stimulus which elicits a



A. Cleft of the soft palate only. B. Cleft of the soft and hard palate. C. Cleft of the soft and hard palate and one side of the premaxilla. D. Cleft of the soft and hard palate and of both sides of the premaxilla.

response 50 per cent of the time) measured by bone conduction are normal, whereas the air conduction hearing levels may be up to 60 decibels (dB) poorer than the bone conduction scores (air-bone gap) (Davis and Silverman, 1970). One of the characteristics of a conductive hearing loss is the fact that it is medically or surgically treatable; whereas, the sensorineural type is rarely influenced by medical or surgical intervention (Shambaugh, 1967).

A sensorineural hearing loss is a hearing impairment due to abnormality of the cochlea, the auditory nerve, the brain or any combination of these and the air-bone gaps are smaller or absent in this type of hearing impairment (Littler, 1965).

A mixed loss is a combination of the conductive and sensorineural type wherein the bone conduction thresholds are below normal but not as poor as the air conduction hearing levels (Berry and Eisenson, 1956).

Hearing Loss in Cleft Palate Individuals

A lengthy investigation was undertaken by Gaines (1940) to ascertain the problems of hearing loss in cleft palate children. He concluded that persons with cleft palate show a higher incidence of hearing loss than do non-cleft individuals.

The incidence of ear pathology in cleft palate patients has been reported to be 6 per cent during the first year of life, 27 per cent in pre-school children and 68 per cent in school age children (Skolnik, 1958).

The type of hearing loss found in cleft palate individuals is predominantly conductive (Sataloff, 1952, 1956; Miller, 1956; Spriestersbach, 1962). Because of the nature of the conductive

hearing impairment, cleft palate patients are often found to have fluctuating hearing levels from one month to the next (Harrison and Philips, 1971).

Although middle ear pathology has generally been the diagnosis in persons with cleft palate, there is disagreement as to the etiology of the Eustachian tube dysfunction which causes much of the disease (Miller, 1956). Zemlin (1968) reported that the primary biological functions of the Eustachian tube are (1) to permit middle ear pressure to equalize with external air pressure and (2) to permit drainage of normal and diseased middle ear secretions from this cavity into the nasopharynx. Figure II illustrates the anatomy of the middle ear.

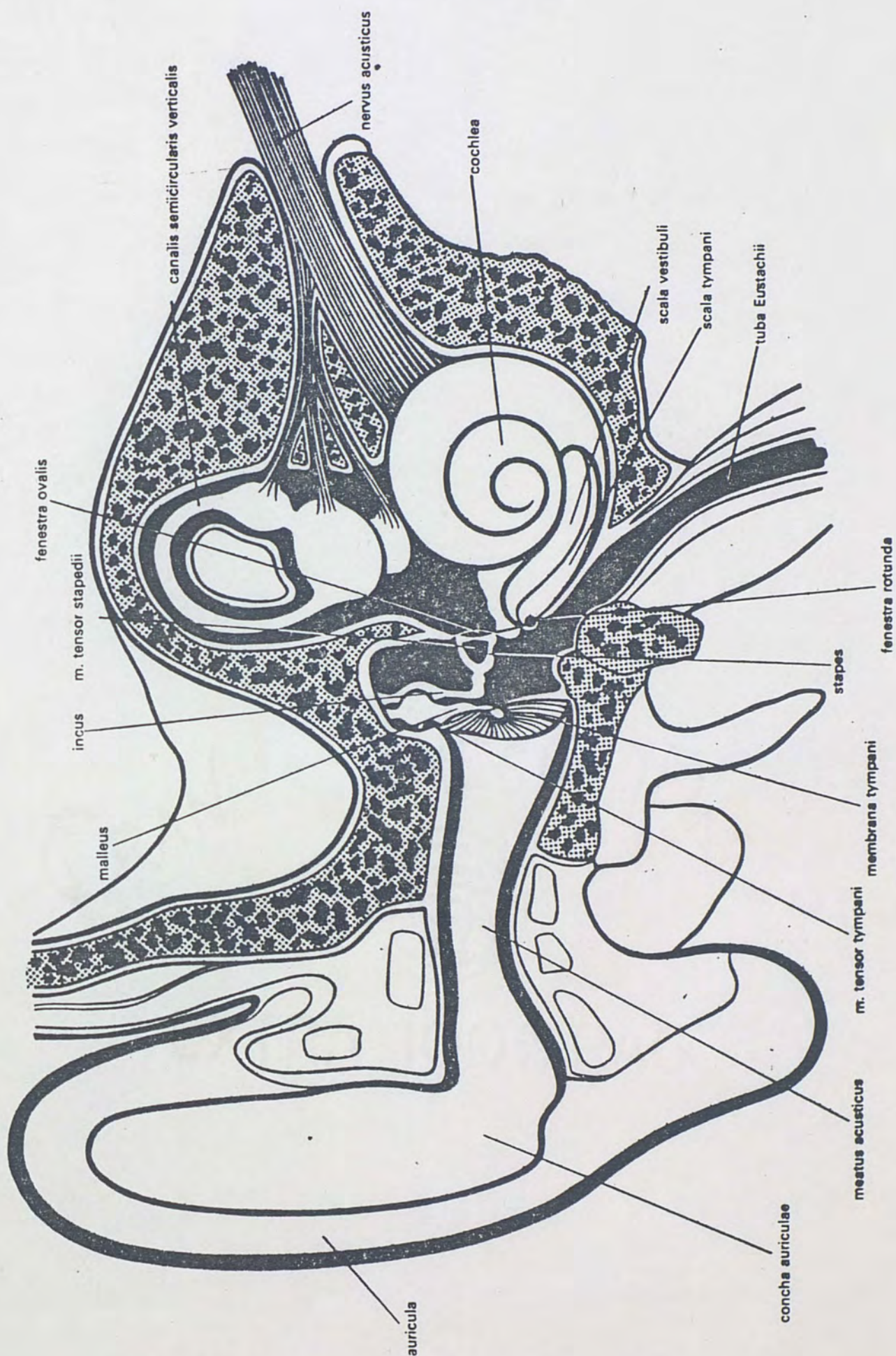
Gaines (1940), Sataloff (1956) and Masters et al., (1960) indicated that the etiology of conductive losses in cleft palate persons is due to impaired function of the Eustachian tube caused by anatomical deviations of the musculature of the palato-pharyngeal valve.

Miller (1956), on the other hand, found that hearing loss can be attributed to the practices of some cleft palate surgeons who frequently produce scarring or distortion of tissues at the orifice of the Eustachian tube thus interfering with its normal function.

Masters et al., (1960) support Miller's conclusion that the pathogenesis of hearing loss in the cleft palate population is primarily related to problems of Eustachian tube dysfunction; however, these problems would exist regardless of whether or not they underwent palatal surgery.

Shambaugh (1967) indicated that malfunctioning of the Eustachian tube, either by functional, genetic or surgically acquired reasons

Figure II



Compliments of North American Phillips Corporation
Long Island City, New York

causes the middle ear to be subject to serous otitis (middle ear fluid). This condition is commonly found in a cleft palate population, particularly in the young (Spriestersbach and Sherman, 1968). Serous otitis may lead to middle ear infection (otitis media). Otitis media has been revealed in 80 per cent of routine examinations of the middle ear in autopsies on infants and children under the age of three (Shambaugh, 1967). Ninety-four per cent of the ears in cleft palate infants examined by Stool and Randall (1967) contained infection. Shambaugh (1968) further stated that anything that interferes with the normal functioning of the Eustachian tube inclines the patient to an acute bacterial otitis media.

Zemlin (1968) concluded that in children the Eustachian tube is about half the length and more horizontal than in adults which results in the young being more susceptible to middle ear infections and the inhibition of normal drainage from the middle ear cavity.

Research indicates the incidence of hearing loss in cleft palate cases is 25 to 60 per cent (Gannon, 1950; Means and Irwin, 1954, Holmes and Reed, 1955; Miller, 1956). More recently, Harrison and Rhilips (1971) conducted audiological studies on nine pre-school cleft palate children. They tested each child once a month for six consecutive months to determine if fluctuation of hearing levels existed. The incidence of hearing losses were reported on the basis of data obtained during any single month. The proportion of subjects having abnormal hearing ranged from 25 per cent in one month to 71 per cent in another.

These preliminary data show that, in addition to the otitis media noted by the otologic investigators, decreased hearing also appears universal. During the six month period, 100 per cent of

the study group had abnormal hearing levels at some time, and 78 per cent of the group experienced intermittent fluctuations in hearing levels during this relatively short observational period (Harrison and Philips, 1971).

This data further supports the concept of the universality of otitis media in cleft palate children (Miller, 1956; Shambaugh, 1967; Zemlin, 1968; and Paradise et al., 1969).

The incidence and degree of hearing loss in a population of children with case histories of acute or chronic otitis media will vary markedly depending on the particular month that the test was conducted (Nober, 1967). The months of January and February are notorious for cases with a history of otitis media while the month of May through July adversely affect children with allergies (Eagels, et al., 1963). The incidence fluctuation can be as high as 20% to 25% relative to the time of year the data was collected (Nober, 1967).

It would seem then that cleft palate individuals are susceptible to reoccurring or chronic conductive hearing impairments (Spriestersbach and Sherman, 1968). The frequency of this episodic hearing loss in the cleft palate population is the subject of this study.

Statement of the Problem

Cleft palate children are subject to hearing loss. This loss can be attributed to middle ear pathology. Many researchers (Holmes and Reed, 1955; Sataloff, 1956; Stool and Randall, 1967; Paradise et al., 1969; Harrison and Philips, 1971) feel the hearing loss can be prevented in cleft palate children. The above researchers suggested that such prevention can be brought about by (1) more frequent audiological and otologic examinations and (2) better parent counseling.

Holmes and Reed (1955) make a "plea" for parents and physicians concerned with cleft palate patients to be aware of the great importance of early treatment of minor ear infections. A more aggressive method of therapy must be developed to prevent otitis in children with clefts of the palate (Stool and Randall, 1967). If middle ear problems persist throughout infancy or longer, it may have untold effects and serious implications for intellectual, speech, and emotional development in the child (Paradise et al., 1969).

Part of the prevention of permanent hearing loss in cleft palate cases, as stated above, is educational counseling of parents. It seemed that further study should be undertaken to describe the fluctuation of hearing loss in cleft palate individuals. This data could be helpful in parent counseling, in medical management and in assessing the educational needs of the cleft palate child. Such information could be invaluable to the teacher, the parent, the speech

pathologist, the pediatrician or anyone else intimately involved in the total development of the cleft palate child.

An attempt was made to answer the following questions:

(1) Do the hearing abilities of cleft palate children fluctuate significantly on a week-to-week basis?

(2) Are parents of cleft palate children aware of hearing fluctuations in their children on a week-to-week basis?

Methodology

Test Site

All testing was conducted in the Audiology Department of the Volusia Easter Seal Center, Daytona Beach, Florida.

Subjects

Experimental Group. This group was composed of ten cleft palate children who were mature enough to condition to pure-tone audiometric testing. They ranged in age from 3 to 17 years. All had surgically repaired clefts by 20 months of age involving at least, but not restricted to, the soft palate.

Six of the cleft palate subjects were located through referrals from a Daytona Beach plastic surgeon and four from local speech pathologists. Three children were educably mentally retarded with special public school placement. The remaining seven subjects were of normal intelligence.

Control Group. This group was comprised of ten non-cleft, non-hearing impaired children ranging in age from 3 to 9 years, mature enough to condition to pure-tone audiometric testing.

The control group subjects all came from Daytona Beach, five from the north sector and five from the south sector of the city. These children were all of normal intelligence; one was identified as having a learning disability.

All control and experimental children were grouped in fives. They were picked-up and delivered to the Easter Seal Center, one group per day, for testing. Transportation was provided to guard against absences and/or mortality of subjects due to the length (8 weeks) of the study (October 1, 1974 to November 22, 1974). Two volunteers were used for transportation and one for supervision while the children were at the testing site.

Instrumentation

Room. A testing suite (Industrial Acoustic Company Model 401A, serial 3039) was used in all audiometric testing employed in this study. The sound level of the Test room was within the standards set down by the United States of America Standards Institute (USASI) for a room to be used for diagnostic hearing testing.

Air Conduction. Pure-tone air conduction threshold for each subject was obtained using a clinical audiometer (Maico 18). A matched set of earphones (TDH 39) was used for all pure-tone testing. All thresholds were determined using the International Standards Organization (ISO - 1964) scale. Frequencies tested were: 250, 500, 1,000, 2,000, and 4,000 Hertz (Hz).

Bone Conduction. Bone conduction thresholds for each subject were obtained at 250, 500, 1,000, 2,000 and 4,000 Hz. A bone conduction oscillator was employed for all bone conduction testing using the Maico 18 oscillator supplied with the audiometer.

Masking. Effective narrow band masking was introduced to the non-test ear using the Maico 18 generator supplied with the audiometer.

Calibration

An electronic check of calibration of the audiometer was done at the onset of the testing period. Biological calibration was performed prior to each testing session.

Parent Interview

Each week every parent was interviewed to obtain information on possible upper respiratory infections, sore throats, hearing loss, ear infections or colds that their child may have contracted since the previous testing. The checklist regarding each child's health status, completed by a parent, appears in Appendix A.

Hearing Loss

Hearing was considered abnormal when a child was found to have a threshold of 30 decibels (dB) or poorer at 250, 500, 1,000, 2,000 or 4,000 Hz or a 20 dB air-bone gap at two or more frequencies tested. This level was chosen because 25 dB (ISO - 1964) has been accepted as the limit of normal hearing (Davis and Silverman, 1970). The air-bone gap criteria was utilized because it is recognized that middle ear problems could cause hearing threshold changes without presenting air conduction thresholds poorer than 25 dB (Davis and Silverman, 1970).

Stimulus Procedure

Prior to testing each child was conditioned using traditional audiometric techniques (Rose, 1971).

The child was seated facing the examiner who monitored the responses through the observation window in the testing suite. The child was instructed to raise his hand each time he heard a tone even

though it might be faint. Responses were recorded on an audiogram. A copy of the audiogram may be seen in Appendix B.

Pure tones were introduced in the following order: 1,000, 2,000, 4,000, 500, and 250 Hz. Each new frequency was presented at a level greater than the anticipated threshold and lowered until threshold had been identified using the descending method prescribed by Rose (1971). Threshold in this study was defined as the lowest level stimulus which elicits a response 50 per cent of the time (Davis and Silverman, 1970).

Bone conduction testing immediately followed air conduction testing. The bone oscillator was placed on the child's mastoid bone. Narrow band masking was introduced to the non-test ear following the method presented by Rose (1971).

Data Analysis

All hearing threshold data was subjected to a one-tailed t test ($p < .05$) and parent checklists were compared with the hearing data. The hearing changes found between consecutive weeks were compared between groups.

Results

Hearing Fluctuation

Table 1 illustrates the differences in fluctuation found in hearing in cleft palate and non-cleft palate individuals at the various frequencies tested on a week-to-week basis. Statistically significant F values ($p < .05$) were obtained at 250, 1,000 and 4,000 Hz for threshold differences between the two groups for three of the seven weekly evaluations. At 500 and 2,000 Hz, four of the weekly sessions yielded difference scores that were statistically significant ($p < .05$). In all cases of significance the t scores were in the predicted direction, as were the non-significant scores.

The percentage of cleft palate individuals that demonstrated hearing losses at any of the test frequencies on a week-to-week basis are presented in Table 2. The range of persons having hearing losses in this group varied from 20% in the first week to 75% in the eighth week.

Table 3 illustrates the variation in thresholds for cleft and non-cleft subjects on a week-to-week basis. The mean change for cleft palate individuals for all frequencies in all weeks was 8 dB compared with a mean change of 4 dB for the control group.

Parent Awareness

Parental Assessment of the hearing abilities and fluctuations of their children may be seen in Table 4. One parent of the control group reported he thought his child had a hearing fluctuation. The parents

TABLE 1

Differences in Hearing Fluctuations Between
Cleft and Non-Cleft Children

Week	Frequency (Hz)				
	250	500	1,000	2,000	4,000
1-2	2.305**	2.636**	1.618	1.352	1.155
2-3	.558	1.939*	.473	1.551	1.081
3-4	1.938*	.809	1.916*	2.194**	2.971**
4-5	1.239	1.711*	.466	2.457**	1.718*
5-6	2.091**	2.132**	3.066**	1.777*	2.649**
6-7	1.528	1.106	1.231	2.174**	1.235
7-8	1.011	1.363	1.706*	.913	.239

*p < .05

**p < .01

Note.--30 df

TABLE 2

Percentages of Hearing Losses

Week	n	Hearing Losses	% With Loss
	Control Group		
1	10	0	0
2	10	0	0
3	10	0	0
4	10	0	0
5	10	0	0
6	10	0	0
7	10	0	0
8	10	1	10
	$\bar{X}= 10$	$\bar{X}= .125$	$\bar{X}= 1.25$
Experimental Group			
1	10	2	20
2	10	2	20
3	10	4	40
4	9	4	44.4
5	8	5	62.5
6	9	3	33.3
7	10	5	50
8	8	6	75
	$\bar{X}= 9.250$	$\bar{X}= 3.875$	$\bar{X}= 43.275$

TABLE 3

Variation in Decibels for Cleft and Non-Cleft Subjects
On a Week-to-Week Basis

Week	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	
	Control Group					
1-2	4	4	5	6	6	
2-3	6	5	5	5	5	
3-4	4	4	3	3	3	
4-5	3	3	3	3	3	
5-6	4	3	3	3	3	
6-7	6	5	4	4	4	
7-8	7	6	5	5	6	
	$\bar{X}= 5$	$\bar{X}= 4$	$\bar{X}= 4$	$\bar{X}= 4$	$\bar{X}= 4$	$\bar{X}= 4^*$
Experimental Group						
1-2	10	11	11	9	9	
2-3	5	8	6	8	7	
3-4	8	5	7	6	8	
4-5	6	6	4	7	6	
5-6	11	9	9	7	9	
6-7	9	8	7	9	6	
7-8	10	10	10	7	7	
	$\bar{X}= 8$	$\bar{X}= 8$	$\bar{X}= 8$	$\bar{X}= 8$	$\bar{X}= 8$	$\bar{X}= 8^*$

*Grand Mean

TABLE 4
Parent Questionnaire Responses

Week	Congestion	Earache	Cold	Medicine	Dr.	Hr. Chg.
	Control Group					
1	6		4	2	1	
2	2		1	1		
3	1	1	2	1		
4	3		2			1
5	1		1			
6	1		4	2		
7	3		3	2		
8	6		5			
Totals:	23	1	22	8	1	1

Experimental Group						
1	1	2	1	1	2	1
2	4	1	3	1	2	1
3	3		2		1	
4	3		3		1	
5	3		2	1	1	
6	2	1	2		1	
7	2		3	1	1	1
8	2		1	1	1	1
Totals:	20	4	17	5	10	4

of two subjects in the experimental group reported they thought their child had a hearing fluctuation on two occasions during the study. Congestion was noted 20 times by the parents of the cleft palate children and 23 times by the parents of the non-cleft individuals. One incidence of earache was reported by a parent of a control subject while four such reports came from parents of the cleft palate children. Twenty-two control subjects were reported by their parents as having colds while 17 of the experimental group parents indicated their children had such illness. Medication of various forms was administered to eight of the children in the control group and five of the experimental group. One of the non-cleft children was reported to have been seen by a physician during the experimental period whereas ten such visits were made by eight of the cleft palate children. Variables pertaining to the parent questionnaire are discussed later.

Discussion

Hearing Fluctuations

A one-tailed t -test ($p = .05$) was performed on the change scores between the groups from week-to-week at each frequency tested in all subjects (Table 1). Seventeen of 35 frequencies tested indicated that hearing ability significantly fluctuated in cleft palate children. It was interesting to note that not only were the significant t scores in the predicted direction, but non-significant differences were also in the predicted direction; that is, cleft palate individuals had greater hearing fluctuation than non-cleft individuals.

Significant differences in hearing fluctuations were demonstrated for all frequencies between the 5th and 6th week. One cleft palate child showed a 23 dB threshold shift unilaterally in week 5 which may account for the high fluctuation noted during that period.

It appeared that the non-cleft subjects seemed to contract colds during the last two weeks of the study thus creating hearing losses in that group which may account for the lack of difference between groups.

As previously mentioned, hearing fluctuation has been reported to vary as much as 20% to 25% depending upon the month in which the testing was performed. October and November are reported to be months in which environmental influences on hearing acuity are minimal (Nober, 1967). It was partially for this reason that these months

were used in this research. These factors should be recognized when noting changes in thresholds since a less stable climate and other months would have undoubtedly resulted in even greater fluctuations in hearing abilities.

Percentage of Hearing Losses

Table 2 reveals that 43% of the cleft palate population had hearing loss which favorably compares with the findings of Nober (1967) when he reported an incidence of 48% having hearing loss in this population. The range of subjects with hearing loss varied from a low of 20% in the 1st week, to a high of 75% in week 8. Only 1% of the non-cleft subjects demonstrated hearing impairment. It should be noted that the only hearing loss identified in the control group was in the same week as the highest incidence of loss in the experimental group.

Harrison and Philips (1971) also did their testing in Florida and found hearing loss ranging from 25% to 71% in their cleft palate subjects. Although both studies indicate essentially equal percentages of cleft palate children with hearing losses, this research demonstrates that fluctuations occur even on a week-to-week basis. The educational management of these children, it would seem, becomes more of a problem since their hearing abilities alter over relatively short periods of time.

Threshold Change

Table 3 illustrates the mean threshold changes in dB. The cleft palate child varied an average of 8 dB each week, while the non-cleft child changed only 4 dB over this period. One must realize that the

dB is on a logarithmical scale and 4 dB (difference between groups) presents almost a doubling of the "loudness" difference between groups. This variation, added to the hearing loss found in almost half of the experimental group, points out again the need for special educational considerations for these children.

Unequivocally, the hearing loss in cleft palate is a conductive impedance due to otitis media of the middle ear cavity as suggested by Nober (1967). The first stage of otitis (exudation) shows hearing near normal (Shambaugh, 1967). Therefore, during weekly speech therapy sessions the cleft palate child should be audiometrically monitored. He could be suspect of the first stage of otitis media if the child's hearing notably decreased more than 8 dB from one week to the next, even though it may still remain in the "normal" range (0-25 dB, ISO - 1964).

Parent Awareness

Hearing fluctuations, as suspected, were generally not reported by the parents of the non-cleft group. The one report was in week 4 while in actuality the only fluctuation occurred in week 8. When in the 4th week the parent reported a possible fluctuation, a drop of 5 dB in one frequency in the right ear was noted. However, a 5 dB shift in one frequency could not be considered clinical significance.

In general, the parents of cleft palate children were recognizing the hearing fluctuations demonstrated in their children. This contradicts Holmes and Reed (1955) who generally felt parents of cleft palate children are not aware of hearing changes in their children.

The differences found between control and experimental reports of congestion in conjunction with doctor visits may be attributed to the home environments. Six of the control group subjects were children of physicians, where medication would be more accessible without office visits. This may also explain the higher incidence of medication taken by the control group.

The number of earaches reported was higher in the experimental than in the control group. Perhaps the higher incidence of medication administered to the control group warded off the second stage of otitis (suppuration) which is symptomized by earache (Shambaugh, 1971).

The control group took more medication but reported more colds and congestion. It is suspected that the level of sophistication of the parents of non-cleft children made them more conscious of juvenile colds and congestion; whereas, the almost constant upper respiratory infections of the cleft palate children were not perceived by their parents as being that different from their usual condition.

Suggestions for Future Research

Further research is needed using a larger sample and using subjects which would all be classified as normal I.Q.

As suggested by these results, there is a need for a planned program for parental education and routine audiometric monitoring.

Summary

Cleft palate children are subject to hearing loss because of middle ear pathology. Many researchers (Gannon, 1950; Means and Irwin, 1954; Holmes and Reed, 1955; Miller, 1956; Harrison and Philips, 1971) have studied hearing fluctuations of cleft palate children by audiologically monitoring their thresholds.

An attempt was made to study the hearing variation in cleft palate children during short intervals (weekly) rather than over longer periods as previously researched. Parental awareness of hearing fluctuations were compared with audiometric data to test the reliability of such reports.

Ten surgically repaired cleft palate children were audiologically tested once a week for eight consecutive weeks. These data were compared with the thresholds of ten non-cleft, non-hearing impaired children who were audiometrically evaluated on the same schedule as the cleft palate children.

Results demonstrated that the hearing of cleft palate children significantly fluctuate more than the non-cleft palate children.

The cleft palate subjects demonstrated an incidence of hearing loss ranging from 20% to 75% for the eight weeks. This data favorably compares with other research studying incidence of hearing loss in cleft palate populations.

The hearing of the cleft palate child varied an average of 8 dB each week while the non-cleft child changed only 4 dB over the same

period. An 8 dB shift in hearing from one test to the next is considered to be of clinical significance in the field of audiology. A decrement in hearing of this magnitude is often symptomatic of the early stages of otitis media and, therefore, should point out to the therapist the importance of audiometrically monitoring the hearing of his cleft palate clients.

Parents of both groups of children seem to be aware of the presence or absence of hearing fluctuations demonstrated by their children. It may be concluded further that parents of non-cleft children are more cognizant of the presence of upper respiratory infection in their children than are the parents of cleft palate children.

APPENDIX

APPENDIX A

Parent Checklist

 Has your child experienced congestion within the
yes no last week?

 Has your child experienced an earache within the
yes no last week?

 Has your child experienced a cold within the last
yes no week?

 Has your child started any medications within the
yes no last week?

 Has your child seen a physician within the last
yes no week?

 Have you noticed a change in your child's hearing
yes no last week?

Child's Name

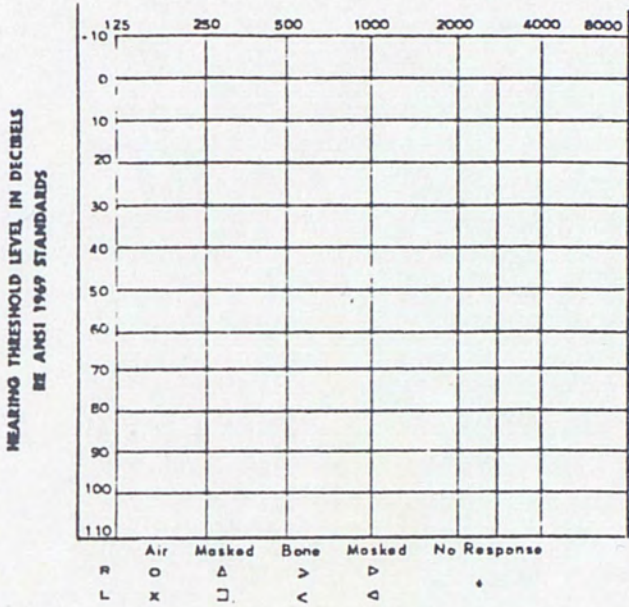
Week of Testing

Date _____

APPENDIX B

VOLUSIA EASTER SEAL CENTER
1219 Dunn Avenue
Daytona Beach, Florida 32014
Phone 255-4568

Name _____ Age _____ Response _____ Date _____



Audiometer _____ Test No. _____

OTHER TEST RESULTS

SPEECH AUDIOMETRY

	SRT (dB)	Discrimination (%) Conversational Level	dB Sensation Level
Right			
Left			
Binaural			
Recommended Aid			

Interpretation:

Recommendations:

Audiologist _____

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CRIMINALS' THESIS ID
EXTRA 1004 HAS

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